

9-2-1,2

Bridge Building

Grade Level	Ninth
Minimum Time Required	90 Minutes
Materials/Resources	Internet Access-computer, toothpicks, white glue, speaker, cardboard(15cm x 35cm), metric ruler, calculator, string, weight, wax paper (30cm x 40 cm), bottle caps
Subject Area(s)	Math – Science - Guidance

Project Description:

1. In this lesson, students will:
 - a). research and design a bridge using the elements and principles of design.
 - b). select the materials needed to construct the bridge.
 - c). compute the cost of materials to build the bridge.
 - d). keep a journal of daily transactions and company happenings.
 - e). apply mathematics and science principles during design process.
 - f). construct the bridge.
 - g). use correct grammar and spelling in all reports.

Career Development Standard	Skills to interact positively with others.
Career Development Indicator	Demonstrate effective interpersonal skills. Demonstrate interpersonal skills required for working with and for others.
Delivery Level	Review
Academic Standards	
Language Arts	1.1.c use prior knowledge and experience to interpret, evaluate, and construct meaning from various texts. 1.4.a access and use multiple information sources for variety of purposes, e.g., Internet, CD-ROM, print materials, video materials, library. 1.4.b evaluate the validity and reliability of various technical and functional materials. 1.4.c compile and synthesize information to make reasonable and informed decisions. 2.1.c revise and edit written work using essential and refined conventions of standard English. 4.3.c use various auxiliary resources to facilitate oral presentations, e.g., visual aids, special effects.
Science	2.3.b Evaluate relationships between force and motion.
Math	3.1.a determine the referents used in relating different scales. 3.1.b justify the appropriateness of a scale selected for measurement situations. 4.1.b deliver oral information in a logical, organized, and coherent manner.
Employability/SCANS Skills	Thinking Skills, Interpersonal Skills, Basic Skills

Assessment/Rubric	Students will be assessed according to the attached Rubric Evaluation form.
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Submitted by: Oldham-Ramona High School
Northwestern High School

Grading Rubric Bridge Building Project

Bridge Design: 50 points

Points will be awarded according to how well your bridge is designed, neatness, and if it meets required specifications.

Required specifications met for height and length	
Neatness of bridge design	
Design and creativity	
Efficient use of materials	
Total Points Awarded	

Journal: 20 points

Points will be awarded for your daily journal entries. Writing must be honest, neat and clearly dated.

All journal entries neatly written, honest and completed daily	
All journal entries completed, (lacking neatness, honesty, etc)	
Missing journal entries (less than 2)	
Missing journal entries (more than 3)	
No journal entries or no papers turned in	
Total Points Awarded	

Daily Work: up to 30 points

Points will be awarded according to how well your group uses daily time to work on the project.

Group remained on task entire period	
After one warning, group remained on task	
After two warnings, group remained on task	
Three or more warnings needed to remain on task	
Total Points Awarded	

Strength and Cost Contest Points: 20 points

Points will be awarded according to how your group places in the final contest.

First Place	20 points
Second Place	17 points
Third Place	15 points
Fourth Place	13 points
Fifth Place	10 points
Total Points Awarded	

Final Report: 50 points

Points will be awarded based on accurately completing the final paperwork and turning it in by the required deadline.

Budget	10 points
Inventory of supplies used	10 points
Cost analysis	10 points
Summary Report	10 points
Group/Self evaluation	10 points
Total Points Awarded	

Total points awarded for project _____ / 170

Materials List

Toothpicks (sold in bundles of ten)
Cardboard (one piece, 15 cm * 35 cm)
White glue (sold by daily usage)
Thread (sold by the cm)
Building Plan Paper (sold by the sheet)

Non-expense materials

You will be able to use the following materials as needed without a charge:

Wax paper, calculators, rulers, writing utensils, notebook paper and resource information (to find other information from other sources about building bridges).

Strength and Feasibility Contest

After completing construction of your toothpick bridges, the bridges will be judged according to strength and cost. Simply put, the strongest bridges that costs the least to build will be the winner. Keep this in mind while building your bridge.

Final Comments:

After introducing this project and its requirements, if you still have questions, PLEASE ASK. Not being well informed, or making false assumptions about requirements will result in lower grades and higher costs.

Toothpick Bridge Project Self/Group Evaluation Form

Group Evaluation:

Please rate the members of your group throughout this project according to the following scale:

- 5 = Excellent
- 4 = Very good
- 3 = Good
- 2 = Below average
- 1 = Poor

Group Member	Evaluation

Self Evaluation

Please rate your work throughout this project according to the following scale:

- 5 = Excellent
- 4 = Very good
- 3 = Good
- 2 = Below average
- 1 = Poor

Your Name	Evaluation

Remember that all evaluation forms will be kept strictly confidential. Please be honest and fair in your decisions.

Toothpick Bridge Inspection

Date: _____

Inspector #: _____

Company Name: _____

Project Director: _____

1. Were each of the following code items listed below met? Place an "X" in the appropriate column.

Expectations	Meets/exceeds the code	Does not meet the code
The river is 15 cm wide.		
The foundations for the bridge are 2.5 cm from the river .		
The squares for the foundations are 5 cm square.		
Glue was used sparingly -used only to join the toothpicks.		
The bridge touches the cardboard only within the squares drawn.		
The bridge is more than 5 cm high.		
The tagboard boat can travel the length of the river.		
The bridge is at least 4 cm wide.		
The tagboard truck can travel the length of the road.		
The company's plans for the bridge clearly show the four required views (end view, side view, road view and top view).		

2. On a scale of 1 to 5, how well did this company follow their building plans?

3. On a scale of 1 to 5, rate this bridge on neatness of construction.